

# **“Project Scientist” for the Modeling, Assimilation, and Prediction (MAP) Program**

## **Statement of Work**

### **1. Background**

NASA's Modeling, Analysis, and Prediction (MAP) program funds research efforts focused on the study of the Earth's climate and weather, with particular emphasis on global change. To understand fully how and why the Earth climate is changing and the potential long-term implications requires research efforts to be focused upon end-to-end Earth system science. Exploration of interactions between the oceans, the atmosphere, the cryosphere, and the biosphere is accomplished through space-based and in situ observations and through the application of numerical models. In 2005 the MAP program awarded funding for 65 investigations focused on high-priority science areas, including integration of satellite observations with global models to evaluate model development, test the value of specific observations, and consider new observation concepts, with emphasis on addressing the following questions:

- How is global precipitation, evaporation, and the cycling of water changing?
- How is the global ocean circulation varying on interannual, decadal, and longer time scales?
- What trends in atmospheric constituents and solar radiation are driving global climate?
- What are the effects of clouds and surface hydrologic processes on Earth's climate?
- What are the effects of regional pollution on the global atmosphere, and the effects of global chemical and climate changes on regional air quality?
- How can weather forecast duration and reliability be improved?
- How can predictions of climate variability and change be improved?
- How well can transient climate variations be understood and predicted?
- How well can long-term climatic trends be assessed or predicted?
- How well can future atmospheric chemical impacts on ozone and climate be predicted?

The development of consistent, coupled Earth system models is a major goal of the MAP program. Validation of a wide range of Earth observations, with particular emphasis of NASA's satellite data program, is also a priority. In order to assist investigators with the challenging task of developing, integrating, and maintaining complex numerical modeling software, the MAP program is requiring compliance with the US multiagency Earth System Modeling Framework (ESMF; <http://www.esmf.ucar.edu/> ). The program is providing resources through the [NASA Goddard Software Integration & Visualization Office \(SIVO\)](#) to assist investigators with the adaptation of ESMF into their numerical models.

Large investigations include the [Global Modeling and Assimilation Office \(GMAO\)](#), the [Global Modeling Initiative \(GMI\)](#), the [Goddard Institute for Space Studies \(GISS\)](#), support for the [ESMF](#) core development team, a Cloud Modeling and Analysis Initiative (CMAI), along with many other smaller-scale research efforts in data assimilation to support global model evaluation and testing. The total funding for these investigations, over a period of 5 years, is approximately \$150 million. Investigators and collaborators represent more than 17 states and the District of Columbia.

One of the notions advanced in the competition was the development of important science projects that would require the participation of multiple MAP program elements. These projects might also require partnership with resources not funded by the MAP program. Because of the need for sustained investment in modeling and computing to complement the Agency's premiere observing program it is useful to think about the MAP program similarly to NASA's flight projects. That is, there are project goals that need to be met with some schedule. The definition of the schedule is complex, but requires consideration of mission support, participation in the national and international science community, participation in climate and chemistry assessments, and addressing an indeterminate set of questions that arise from scientific investigation. Toward this goal, is the need for the MAP "Project Scientist".

## **2. Task Deliverables**

### *Task 1. Strategic Planning for the MAP Program Office (coordination with NASA Headquarters)*

The contractor shall develop strategic goals for the program, define specific projects to be implemented in support of program goals, provide regular review of program and project plans, and provide consultation on an as-needed basis for resolution of resource conflicts. An example of the type of project foreseen is the program's recent "MAP '06" ( <http://map06.gsfc.nasa.gov> ).

Deliverable: Quarterly written report that enumerates strategic goals for the program and potential projects to advance program goals. The report shall also provide an assessment of the current status of the MAP deliverables from investigators.

### *Task 2. Formulation and Management of MAP Projects (coordination with SIVO)*

The contractor shall provide leadership in the planning and development of an effective communications infrastructure for enabling the MAP science community. This includes acquiring and organizing information from the community, providing a formal interface between the project office and the science community, and providing expert consulting to the program office on priorities and reconciliation of resource conflicts.

Deliverable: Semi-annual written report that states latest requirements for software tools, documentation, and other resources needed for the proposed MAP information system being developed by SIVO.

### *Task 3. Acquisition and Coordination of Information & Applications*

Deliverable: The contractor shall maintain an active database of information related to source code and scientific data being used by the MAP investigators. The contractor shall work with the program office and SIVO to determine the exact requirements for the database.

### *Task 4. Hosting Formal Events*

Deliverable: The contractor shall host regular meetings of the MAP community such that collaborations across agencies and universities are fostered. At a minimum the contractor shall host one meeting per year.

